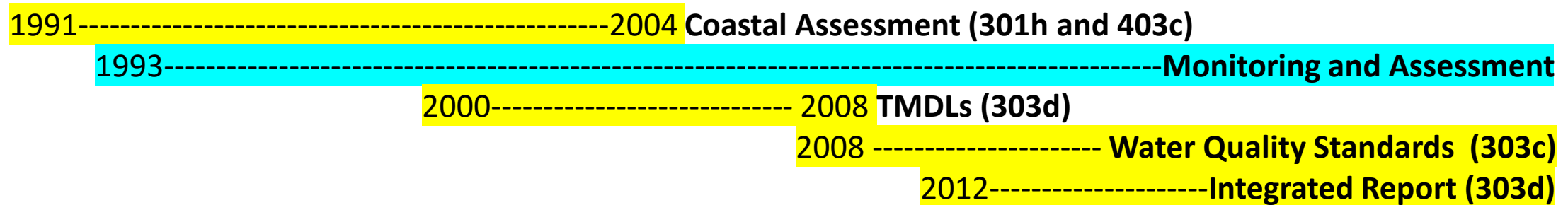
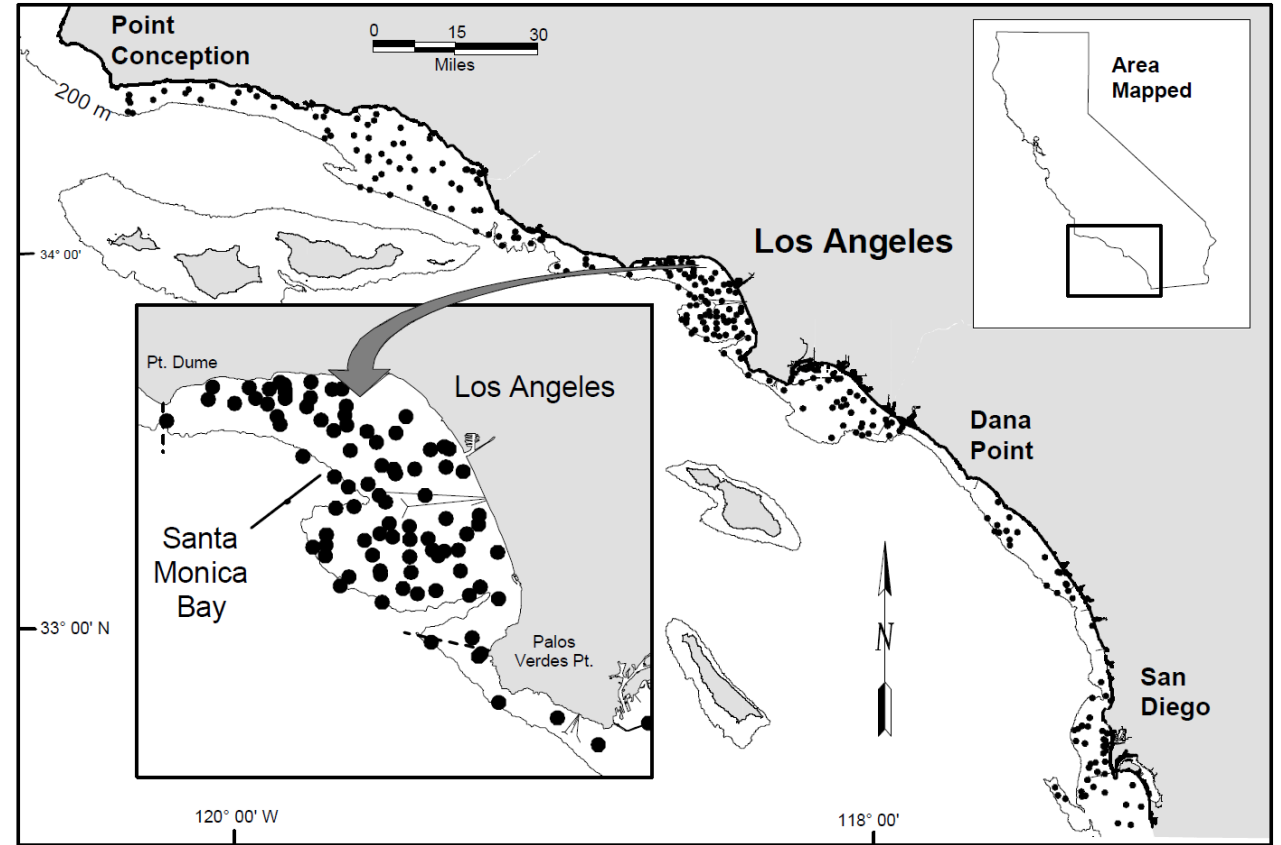


# Reflecting on 25 Years of Bioassessment in Water Quality Regulation

*Terry Fleming, U.S. Environmental Protection Agency*

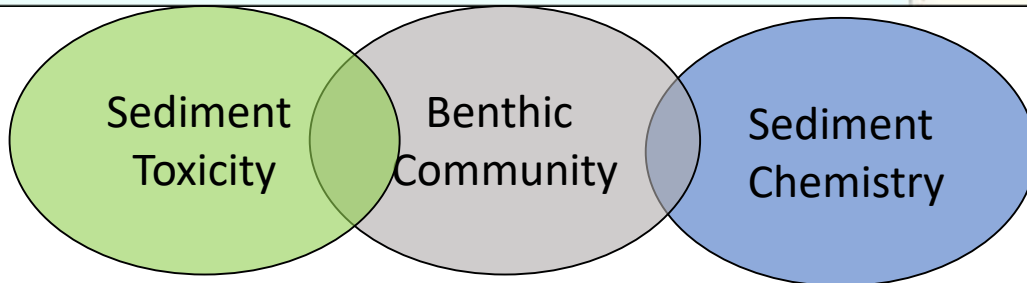


# Assessing Ocean Outfalls (1991-2004)



EMAP Pilot project

Development of Benthic Response Index



## 1993 . EPA Water Division Reorganization

Oceans and Estuaries Section (WTR-7-1)



Environmental Assessment Section (WTR-2-1)



- Assessment

- Grants
- Permits

- Step 1. Look for Inland monitoring data.
- Step 2. Look at Statewide reports (305b,303d)
- Step 3. Rethink Plan
- Step 4. Fix 305b and 303d



1993  
1<sup>st</sup> CABW



*"That was nice, but I don't want to make it a regular thing."*

# Regional Water Quality Control Boards Bioassessment



# Assembly Bill 982 (Ducheny, Statutes of 1999).

## A. Convene Advisory Group on Section 303d

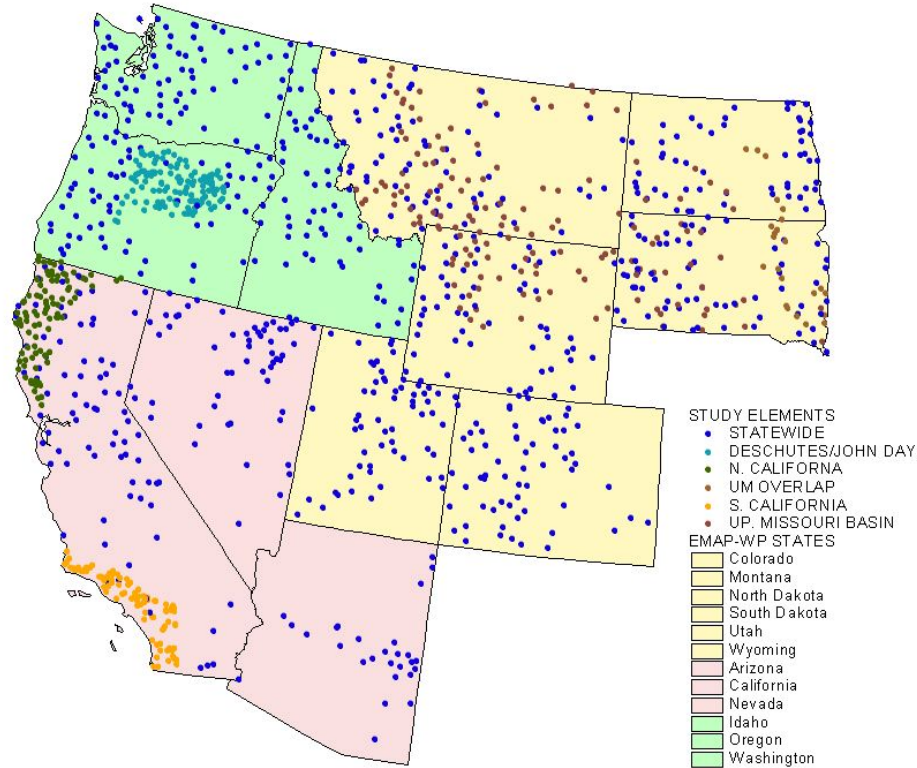
**State Board 303d listing policy 2004** ...*“A water segment shall be placed on the section 303(d) list if the water segment exhibits adverse biological response measured in resident individuals as compared to reference conditions and these impacts are associated with water or sediment concentrations of pollutants”*

## B. Develop proposal for comprehensive surface water monitoring program

**Monitor all Waterbodies and all Uses – SWAMP begins in 2000**

# EMAP Western Pilot

PRIMARY CANDIDATE SAMPLING SITES: 2000-2003



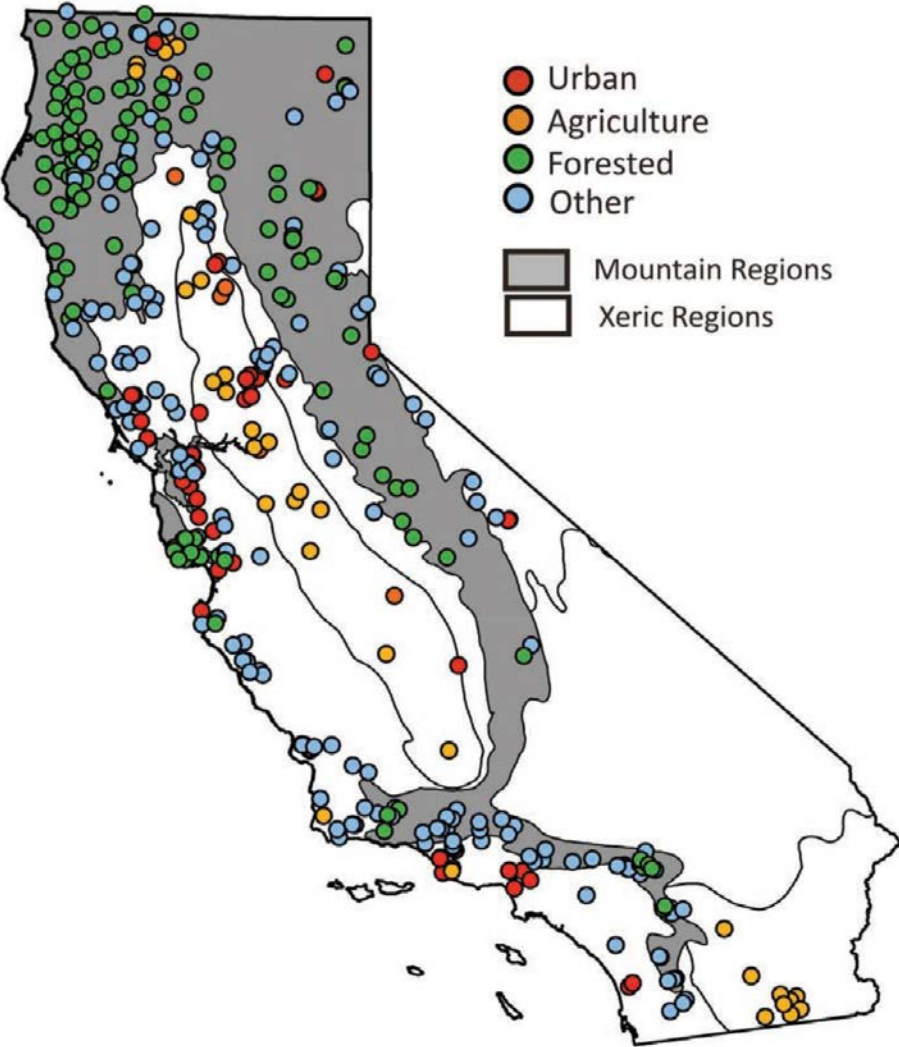
- Inland surface waters
- 2000-2003
- Probabilistic approach
- Base statewide study: 50 sites/state
- Special study areas in CA:
  - Northern Coastal CA -> NC IBI
  - Southern Coastal CA -> SC IBI

**Goal of EMAP: To develop a scientifically defensible framework for translating environmental monitoring data into assessments of condition and to develop tools to assist in providing these assessments**



# CMAP 2004-2008

Working with the Non-Point Source Program to extend EMAP style monitoring



Percent stream miles above thresholds

	AG	URB	FOR	OTH
Bugs	>80%	>70%	<10%	>10%
High Nitrogen	>70%	>50%	>30%	>30%
High Phosphorus	>70%	>40%	<10%	<10%
High Riparian disturbance	>70%	>60%	>10%	>20%
Low Habitat Complexity	>70%	>60%	>10%	>10%
High % fines	>60%	>40%	<10%	<10%



**FINAL TECHNICAL REPORT #1:  
CONDITION ASSESSMENT OF COASTAL STREAMS IN  
SOUTHERN AND CENTRAL CALIFORNIA**

*July 2004*



**Probabilistic Assessment of the Biotic Condition  
of Perennial Streams and Rivers in California**

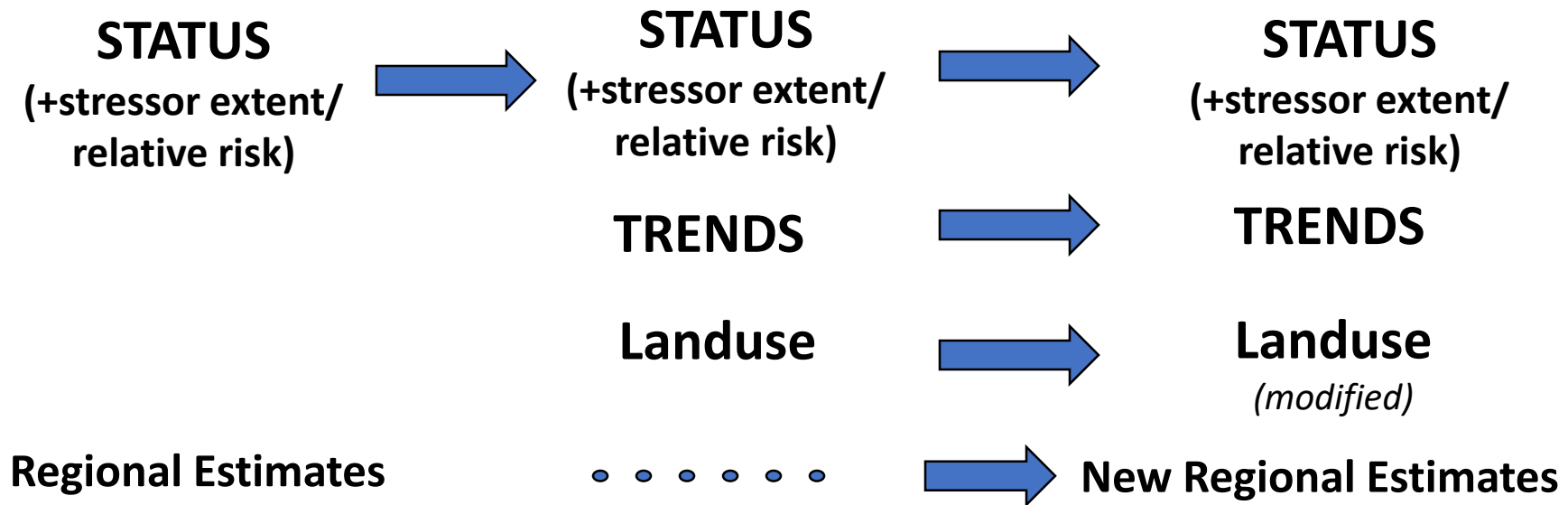
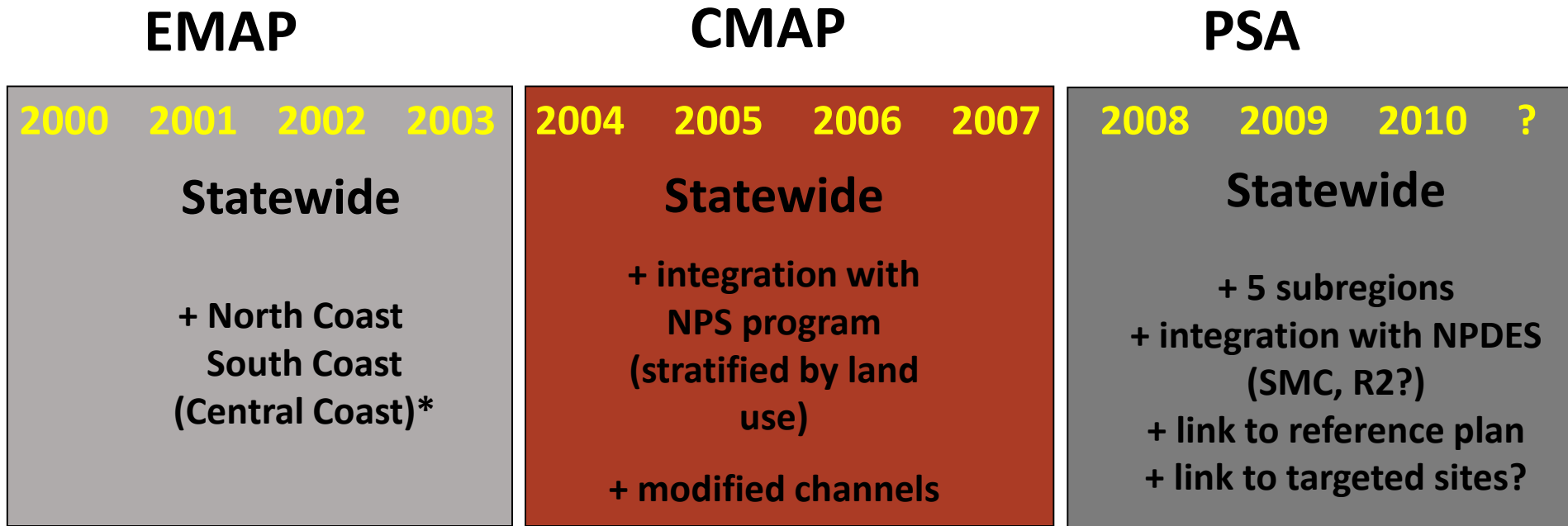
*October 2006*

**First probability-based 305b report**

**Clean Water Act Section 305b Report 2006**

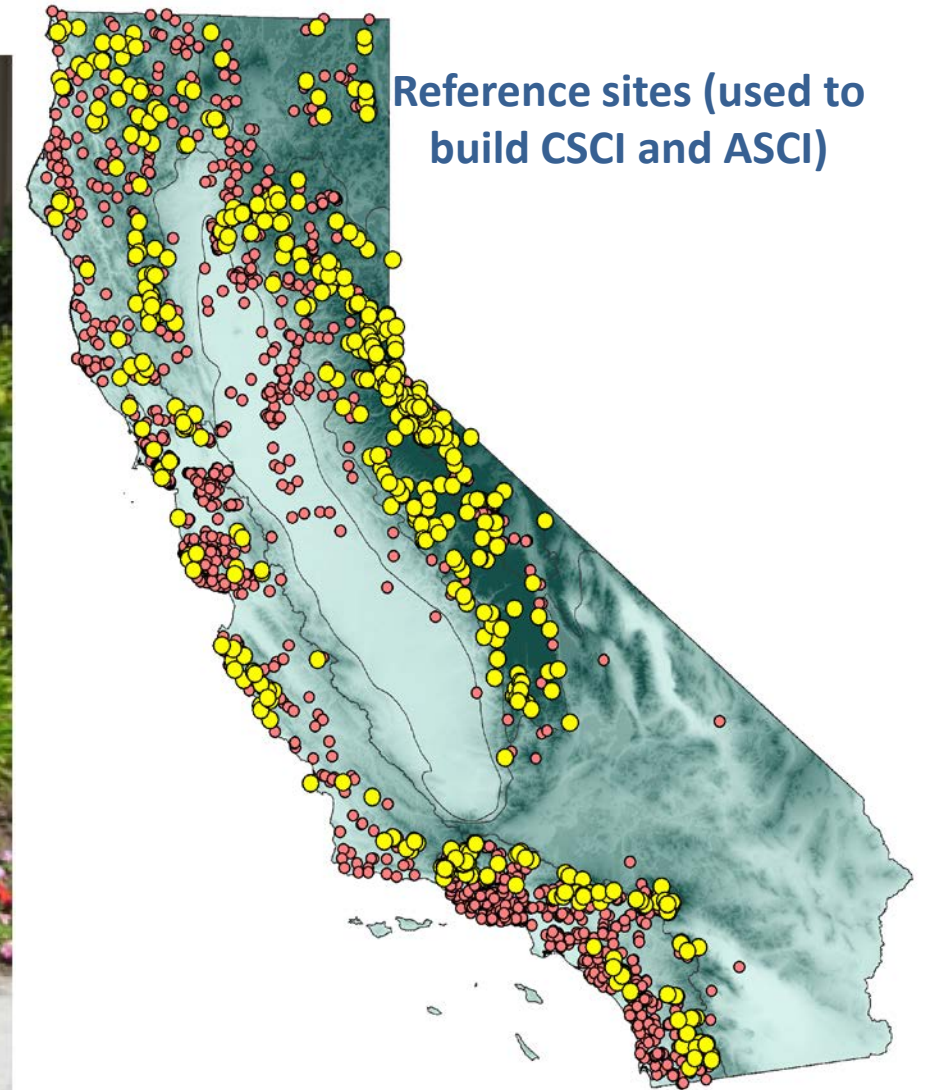
**Water Quality Assessment  
of the Condition of California  
Coastal Waters and  
Wadeable Streams**

**October 2006**



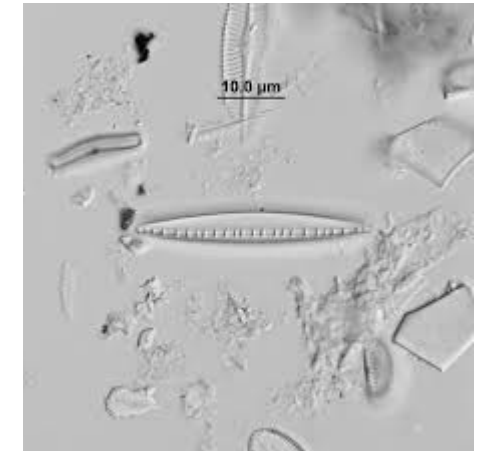
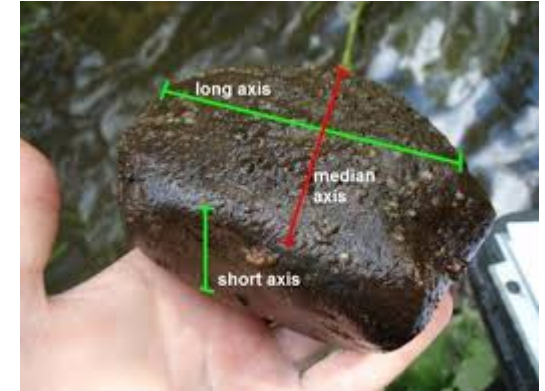
PSA builds on previous designs + adds several enhancements

# Reference Condition Management Plan 2008



Foundation for Statewide metrics





Technical Report

2008

# Incorporating Bioassessment Using Freshwater Algae into California's Surface Water Ambient Monitoring Program (SWAMP)



The Water Boards should integrate biological assessment tools into their water quality programs (i.e., WQS, core regulatory, TMDLs, nonpoint source, etc.).

The State Water Board should develop statewide narrative bio-criteria with or followed by numeric biological endpoints

Adopting biological criteria within a framework of TALUs would enhance its implementation in these programs.

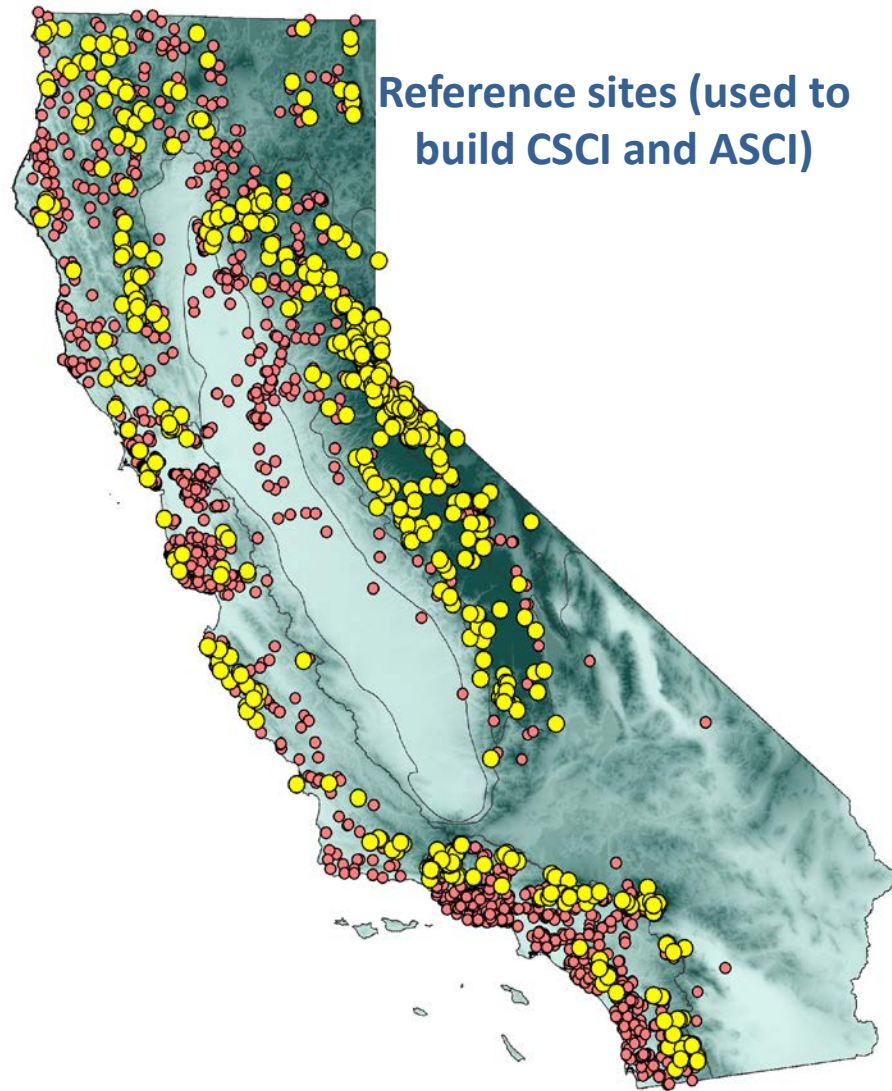
## Evaluation of the California State Water Resource Control Board's Bioassessment Program

*Final Technical Report*

2009

## Evaluation of the California State Water Resource Control Board's Bioassessment Program

# Bio-objectives Effort (2010 – 2013)



Jon Bishop (CABW 2008)

“I want Bio-objectives in 3 years”

\*Produced the CSCI

\* Introduced a Causal Assessment framework (CADDIS)

Faltered on Modified Channels  
(i.e. Central Valley and Urban Storm Channels)

More on modified channels later



After the set-back on bio-objectives, we were all a little disappointed.

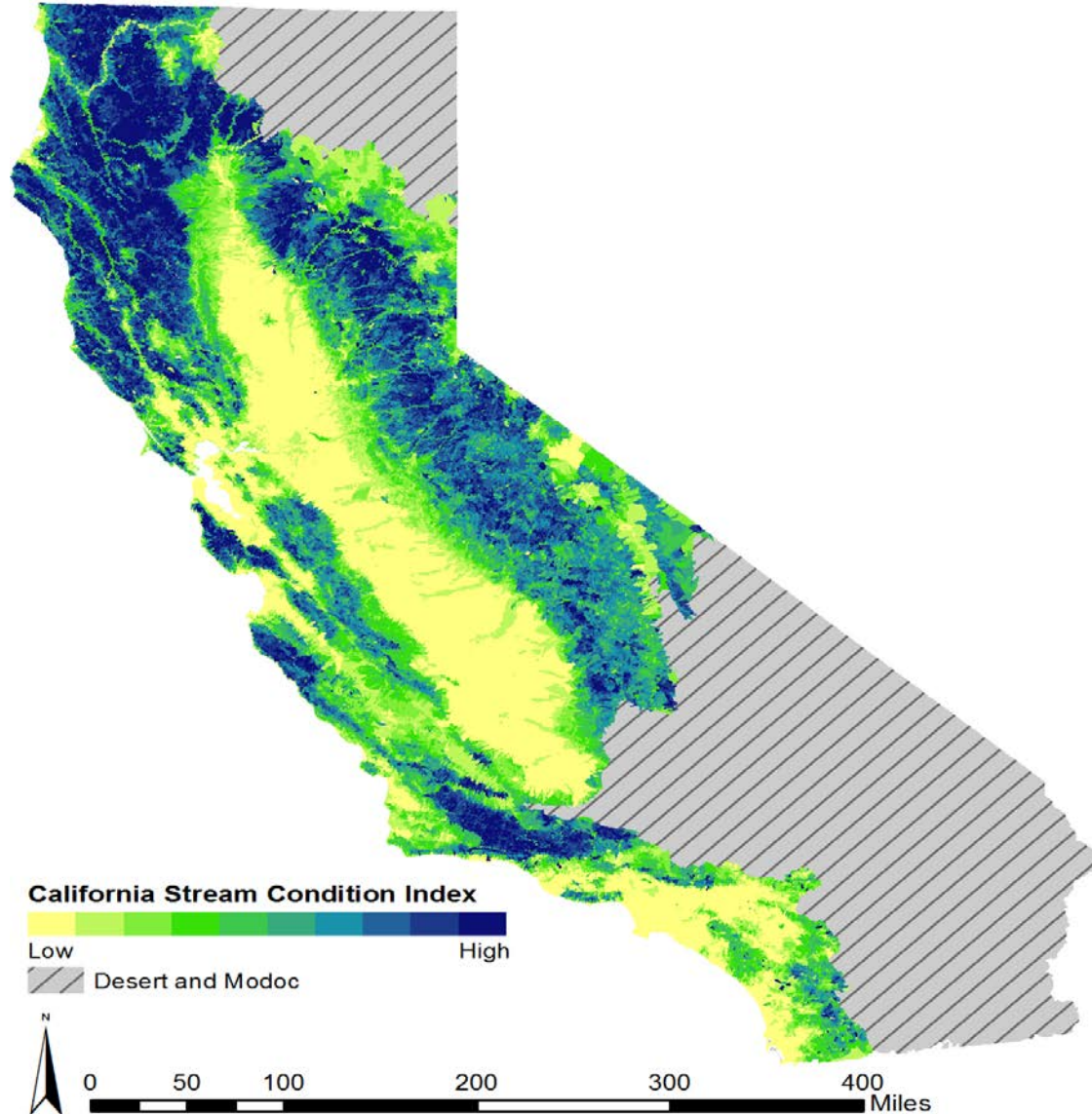
So, I got back on that horse

And we went to work on the healthy watersheds initiative





# CA Healthy Watershed Initiative (2011 -2013)



## Mapping Vulnerabilities

Projected Change in Precipitation

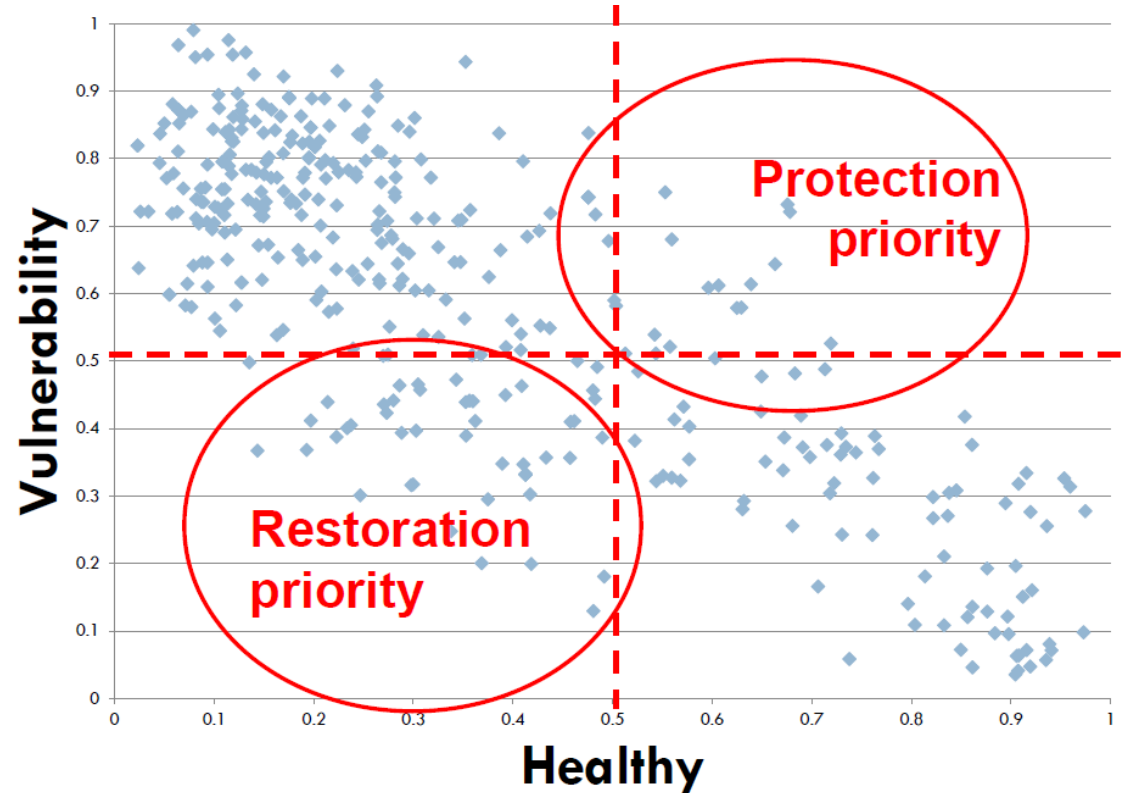
Projected Change in Minimum Temperature

Projected Change in Mean Temperature

Projected Change in Maximum Temperature

Projected Change in Baseflow

Projected Change in Snowpack





Draft Latest Hybrid ASCI (Suzie Theroux, SCCWRP)

Applying a Southern California Algal IBI to State  
Performed moderately well

*Final Technical Report*

2007-11

## Condition of California Perennial Wadeable Streams Based on Algal Indicators

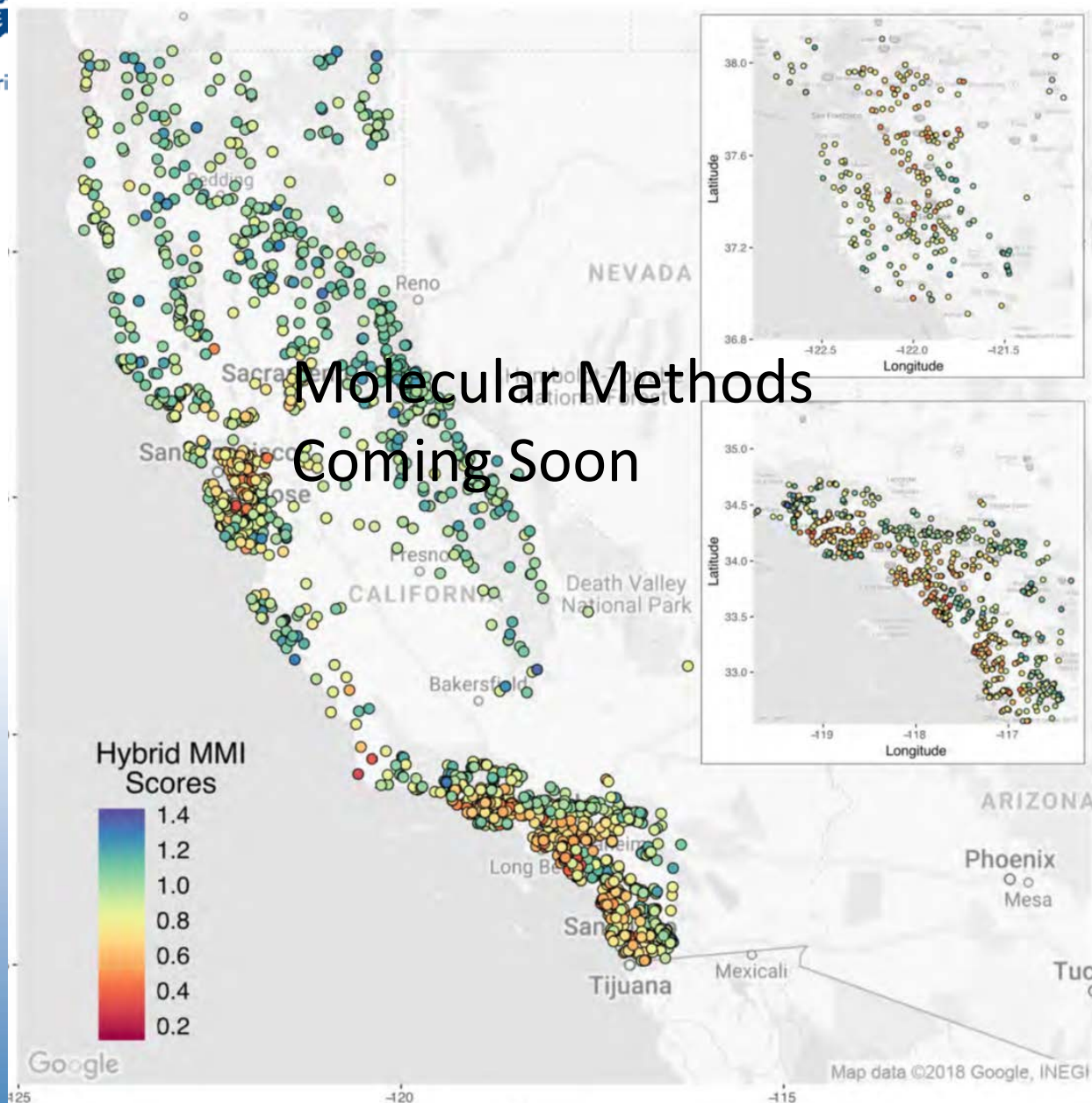
Prepared By:

A. Elizabeth Fetscher<sup>1</sup>  
Martha A. Sutula<sup>1</sup>  
Lillian B. Busse<sup>2</sup>  
Eric D. Stein<sup>1</sup>

<sup>1</sup>Southern California Coastal Water Research Project

<sup>2</sup>San Diego Regional Water Quality Control Board

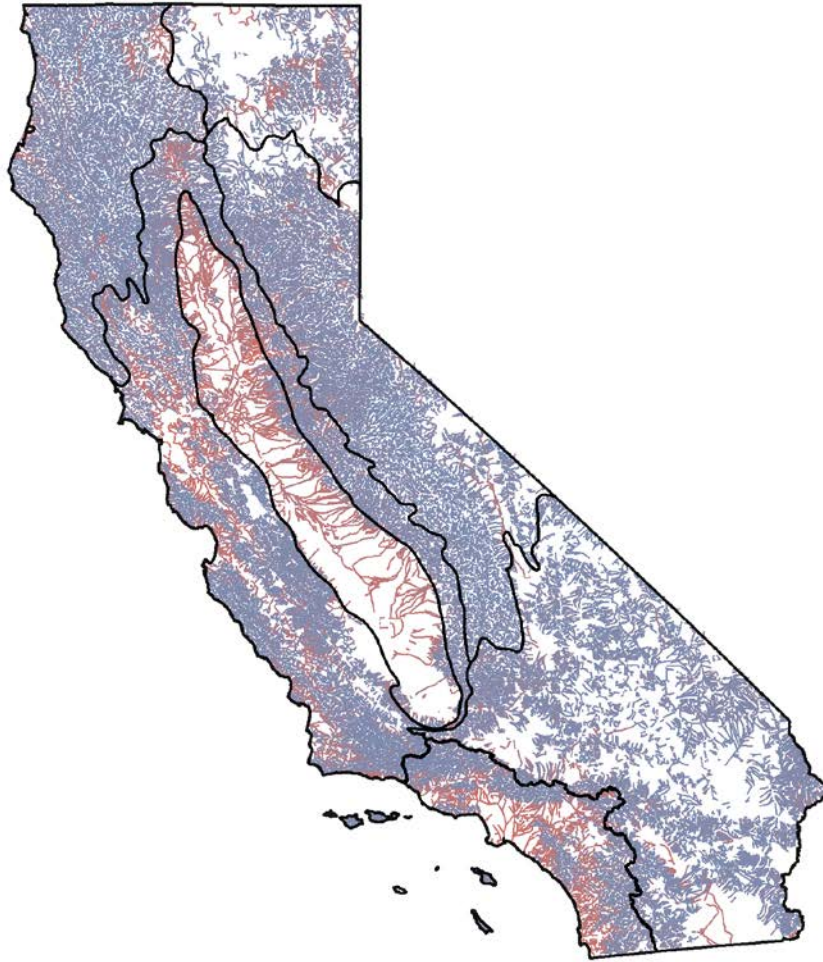
Molecular Methods  
Coming Soon



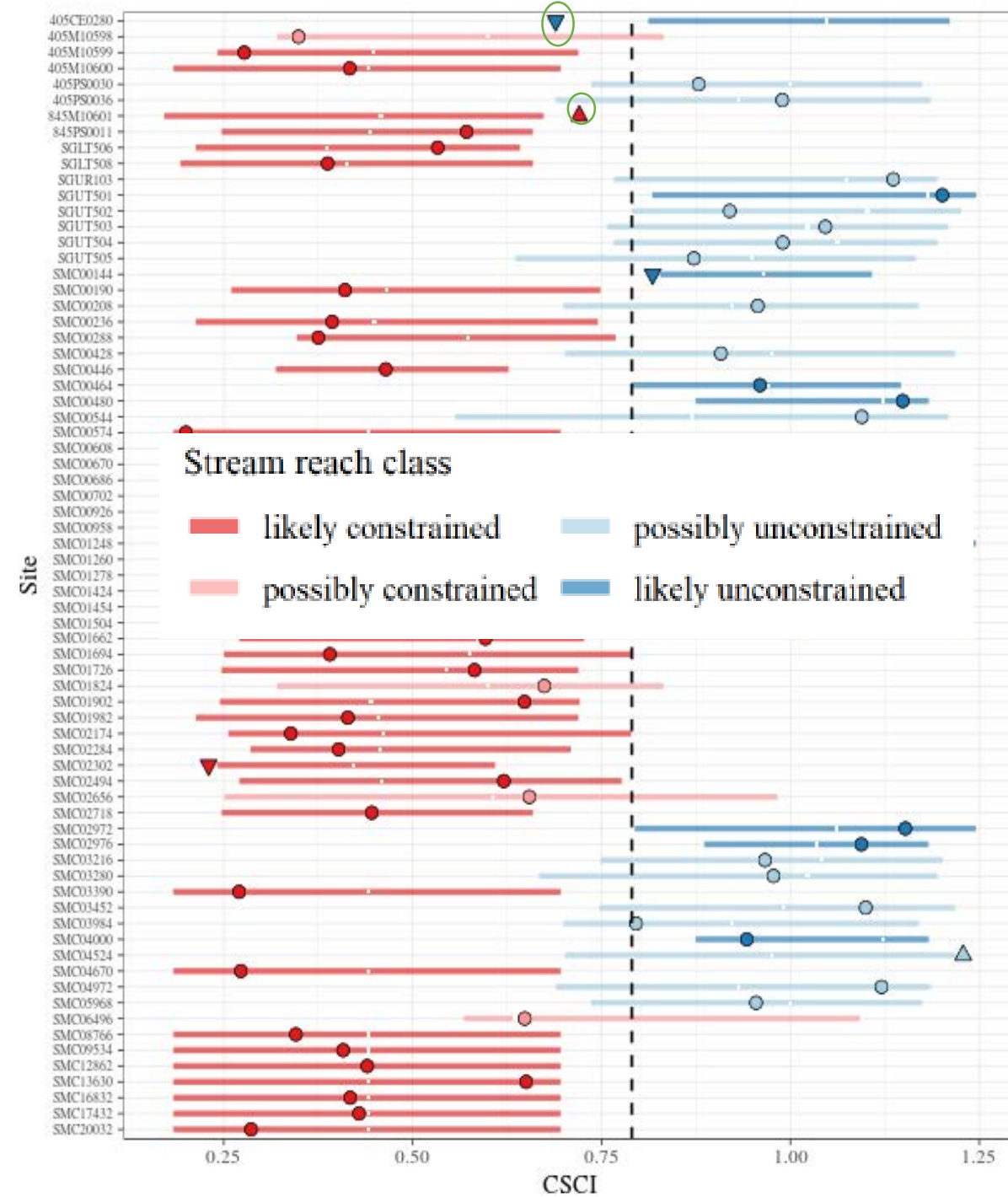


## Modified Landscapes

Reach predicted median CSCI



From Rafi Mazor, SCCCWRP



Draft Predicting probability of attainment against possible nutrient thresholds Rafi Mazor, SCCWRP

Total N

Total P

Chl-a

AFDM

% cover

Ref10



Relative probability of  
meeting biointegrity goal



<50%



50% to 80%



80% to 90%

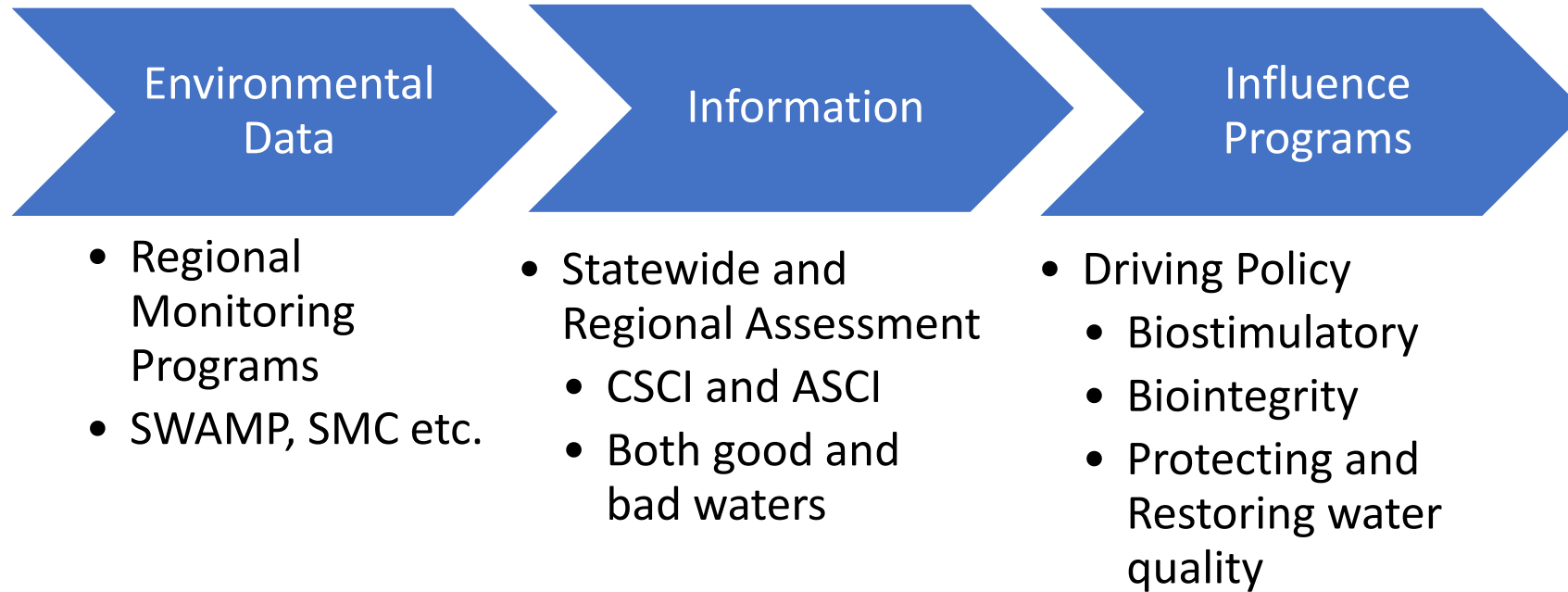


90% to 95%



>95%

## The State Board has a robust Statewide bioassessment program



Note: State has other Regional Monitoring Program (BOG, SPoT, Fhab). You can ask me about them later.



# Available Bioassessment Data

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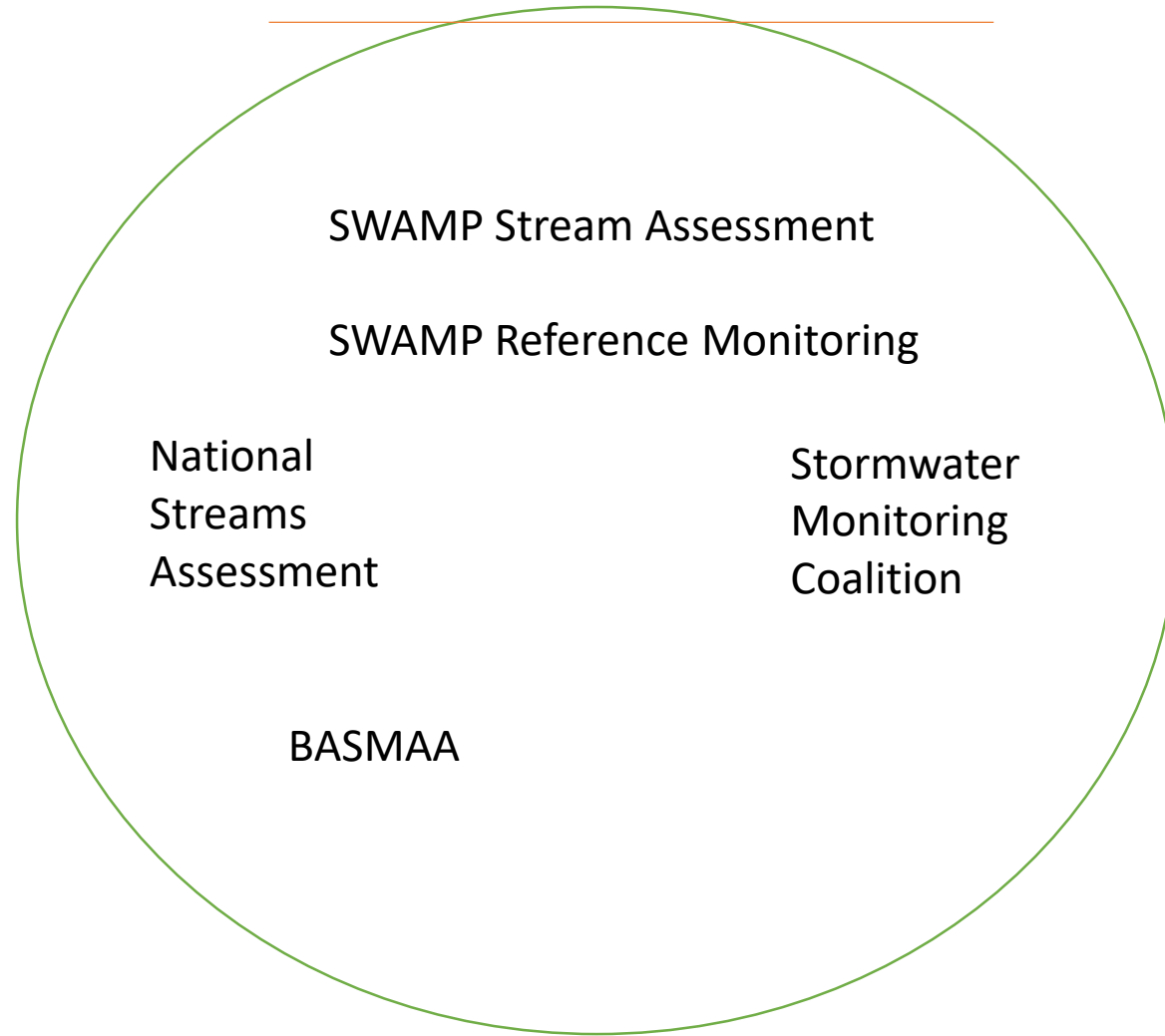


Image of a young  
scientist

